

Topics for discussion

- MDS Issues
 - Maintain Current Technology
 - Transition to New Technology
- Extended PCS band considerations



FCC presentation, MDS issues 12-15-02.ppt



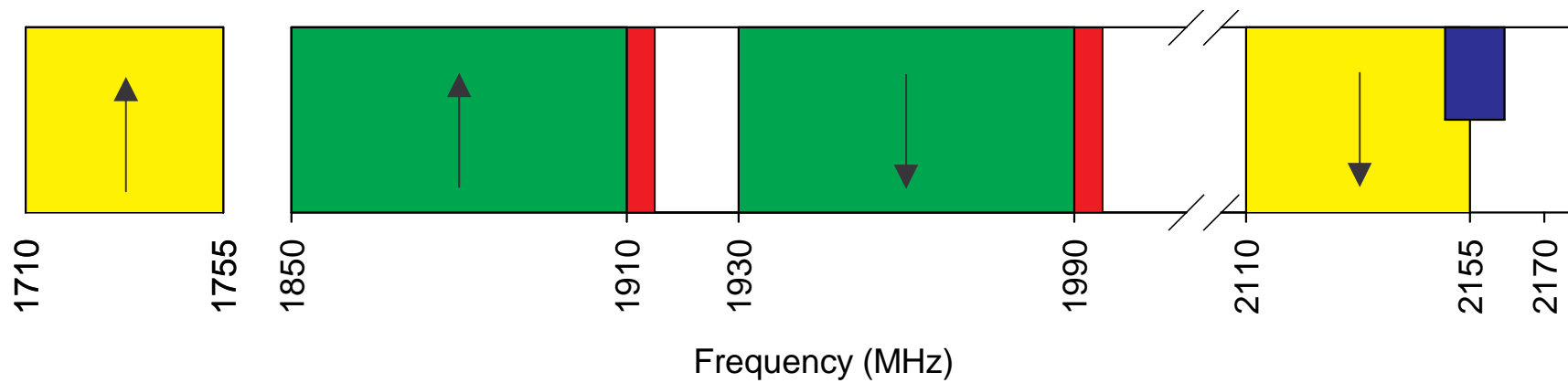
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MDS Issues

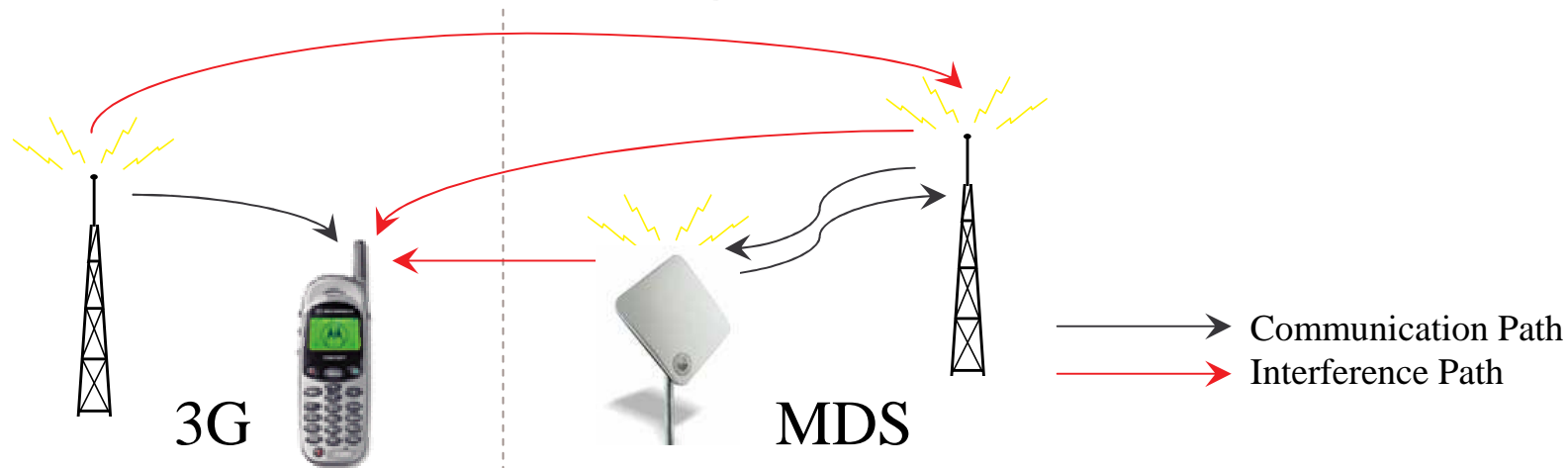
- Operations of MDS in 2150-2162 MHz must be relocated to accommodate FCC 3G Decision
 - Significant guard bands are required between MDS and mobile services
- Assuming MDS Maintains Current Technology
 - If MDS remains in same general bands then a 3-5 MHz guard band is required for compatibility with 3G mobile reception.
 - At a minimum MDS would have to be pushed up to 2158-2170 MHz (possibly 2160-2172 MHz)
 - MDS licensees have previously indicated difficulty of relocating in overlapping spectrum
 - Relocation of current operations to the 1910-1930 MHz band would pose interference issues with current UPCS operations in addition to adjacent PCS base/mobile reception.



Spectrum Chart



MDS and 3G Sharing



- n Out-of-band emissions result in 3dB increase in receiver noise level with a 3 MHz guard band for terminals with-in the following distance:
 - n For MDS base emissions: 552 m
 - n For MDS response emissions: 128 m
- n Receiver Blocking from adjacent channel transmissions
 - n For MDS base stations: 3.9 km \pm 10 MHz
 - n For MDS response stations: 620 m \pm 2.7 MHz

Moving Current MDS operations to 1913 MHz will severely harm PCS operations

- MDS customer response station will interfere with PCS receive base stations operating below 1910 MHz. Out of band emissions would have to be significantly reduced below levels currently allowed in the 2150 MHz band. Technical feasibility of MDS equipment with low out-of-band emissions may be questionable.

	MDS Current OOBE	MDS Reduced OOBE		Note
Transmit bandwidth	125.00	125.00	KHz	
EIRP	16.19	16.19	dBW	21.909(g)(3)
	46.19	46.19	dBm	
Out-of-band reduction	-60.00	-85.00	dB	-60 dB @ 3 MHz offset, 21.908(d)
Out-of-band EIRP	-3.81	-28.81	dBm/1.25 MHz	CDMA2000 Rx BW 1.25 MHz
PCS base receive gain	17.00	17.00	dB	8F/412, CDMA2000 1X
PCS receive sensitivity	-108.00	-108.00	dBm	8F/412, CDMA2000 1X
Degradation of Sensitivity	3.00	3.00	dB	
Interference level	-108.02	-108.02	dBm	
Required loss	121.21	96.21	dB	
Frequency	1910	1910	MHz	
Distance	4539.4	255.2	m	Free Space plus 10 dB



Transition to new technology

- TDD technologies such as those described by the IMT-2000 Family may be used to replace current MDS systems
- Sharing in adjacent spectrum between TDD and FDD technologies has been studied by ITU-R WP 8F
 - ITU-R DNR [IMT.COEXT]
 - Primary concern is interference between BS-to-BS and MS-to-MS
 - Guard band required to minimize interference
 - Size varies depending on scenario studied, 5-10 MHz may not resolve interference issues



Extension of the PCS band for use by similar technology may be compatible with current services

- Pairing of 1910-1916 MHz with 1990-1996 MHz – “G” Block
 - Provides opportunity to leverage current technology in PCS bands
 - Appears feasible using a single duplexer
- Pairing 1915/1916 MHz with 1995/1996-2000 MHz
 - Generally require >40dB of attenuation at 1930 MHz
 - No evidence to support single duplexer
 - Likely requires split band (two) duplexers to achieve noise in a single radio
 - Generally to be avoided due to cost and size
 - Initial evaluations indicate split band filters very difficult to achieve performance
 - -80 dBm/1.23 MHz into Rx band
 - May need lower noise Tx circuits, under investigation



Conclusions

- MDS must be relocated from 2150-2162 MHz band
 - Depending on technology, guard band of 10 MHz of greater would be required
- Moving MDS, with current technical rules into 1910-1930 MHz creates interference to PCS
- It appears feasible to extend PCS band to create new 5-6 MHz “G” block with minimal cost/size/performance impact
- Extending PCS band to include up to 1920 MHz is problematic
 - Not feasible with single duplexer
 - Not clear if it will be feasible to filter as aggressively as required



Backup



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UMTS Specifications in 2110-2170 MHz

- Mobile Receive, Specification 3GPP TS 25.101 v5.3.0
 - Blocking Characteristics (in-band, 2110-2170 MHz):
 - 56 dBm at ± 10 MHz from carrier frequency
 - 44 dBm at ± 15 MHz from carrier frequency
 - Narrowband Blocking Characteristics (1900 MHz)
 - 57 dBm 2.7 MHz offset
 - Receiver thermal noise -99 dBm/3.84 MHz (ITU WP 8F)
- Base Transmit, Specification 3GPP TS 25.104 v5.3.0

- Spectrum emission mask (Output power level > 43 dBm):

Offset (MHz)	Maximum Level	Measurement BW
$2.515 < f < 2.715$	-14 dBm	30 kHz
$2.715 < f < 3.515$	-14-15(f-2.715) dBm	30 kHz
$3.515 < f < 4.0$	-26 dBm	30 kHz
$4.0 < f < 12.5^*$	-13 dBm	1 MHz



* Either 12.5 MHz offset or 2170 MHz, whichever larger

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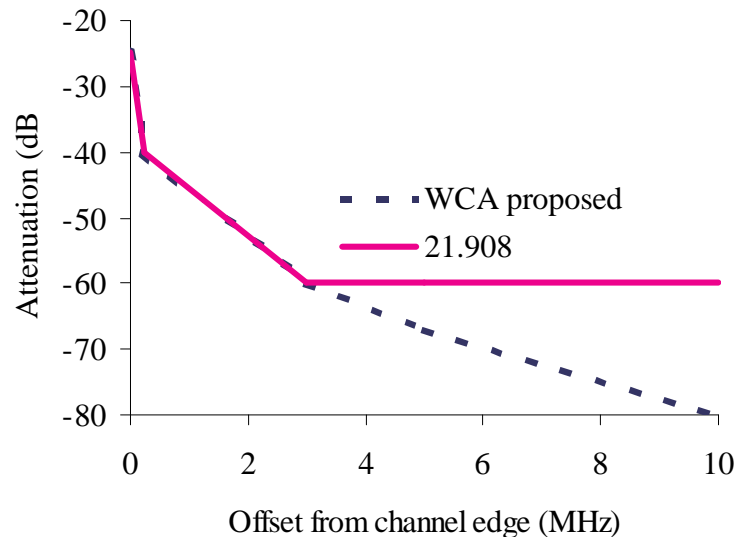
MDS Specifications in 2150-2162 MHz

- MDS Base Stations

- Maximum Power:
21.904 = 33 dBW/6 MHz
- Out-of-band emissions:
21.908 and proposal from WCA
- Antenna pattern? Power control?
- Interference Requirements?

- MDS Response Stations

- Maximum power:
21.909 = 18.2 dBW/200 kHz
 - Assumes 200 kHz bandwidth (i
- Out-of-band emissions: 21.908
 - Will out-of-band emissions proposal from WCA also apply to response stations?
- Antenna Pattern? Power control?
- Interference Requirements?



MDS and 3G Sharing (considerations)

- WCA made prior proposal to limit out-of-band emissions, which help sharing with base stations
 - Antenna pattern would reduce distance
 - 5 MHz guard band required between MDS and 3G
 - Interference distance from MDS base from OOB emissions: 33 m
CPE with same attenuation mask: 22 m
- 3G Receiver Blocking is an issue
 - From MDS base stations separation required to meet blocking requirement (free space + 10 dB)
 - 2.5 km at ± 10 MHz from carrier frequency
 - 620 m at ± 15 MHz from carrier frequency
 - From MDS response stations separation required to meet blocking requirement (free space + 10 dB)
 - 630 m at 2.7 MHz from carrier frequency

